



A.D. 1873, 25th APRIL. N° 1507.

SPECIFICATION

OF

JAMES THEODORE GRIFFIN.

ECONOMISING FUEL AND CONSUMING
SMOKE IN FURNACES.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

26 SOUTHAMPTON BUILDINGS, HOLBORN.

1873.



A.D. 1873, 25th APRIL. N° 1507.

**Economising Fuel and Consuming Smoke in
Furnaces.**

LETTERS PATENT to James Theodore Griffin, of No. 77, Upper Thames Street, in the City of London, for the Invention of "IMPROVED MEANS OF ECONOMISING FUEL, DEVELOPING HEAT, AND CONSUMING SMOKE AND GASES IN STEAM BOILER AND OTHER FURNACES, ALSO IN APPLIANCES THEREFOR."—A communication from abroad by Edgar F. Griffin, of Chicago, State of Illinois, United States of America.

Sealed the 17th October 1873, and dated the 25th April 1873.

PROVISIONAL SPECIFICATION left by the said James Theodore Griffin at the Office of the Commissioners of Patents, with his Petition, on the 25th April 1873.

I, JAMES THEODORE GRIFFIN, of No. 77, Upper Thames Street, in
5 the City of London, do hereby declare the nature of the said Invention for "IMPROVED MEANS OF ECONOMISING FUEL, DEVELOPING HEAT, AND CONSUMING SMOKE AND GASES IN STEAM BOILER AND OTHER FURNACES, ALSO IN APPLIANCES THEREFOR," to be as follows:—

This Invention relates to special means of economising fuel, developing
10 heat, and consuming the smoke and gases within the fire-boxes or fire-

Griffin's Impts. in Economising Fuel and Consuming Smoke in Furnaces.

spaces of steam boiler and other furnaces. It consists in injecting a combination of air and steam into the smoke and flame space in a sheet or veil for the purpose of momentarily checking the passage of the smoke and gases to the tubes or flues, and thereby supplying them with sufficient oxygen for their perfect combustion. Within the fire-box or flame space in lieu of allowing them to be carried away by the draught and their heating properties lost, the sheet or veil of combined air and steam is spread over or above the surface of the fuel at an angle from the upper front edge of the fire-box to the rear of the furnace bars, or from below the feed door to the rear of the bars, as found most convenient, or according to the construction of the furnace. 5 10

In the case of locomotive fire-boxes the air is supplied from the sides into a shell or screen, in which perforations or holes are made corresponding in number to a series of jets or nozzles of a steam pipe enclosed within the screen, the pipe having the jets or nozzles at the required angle. By this means the air entering at the sides becomes heated, and issues into the flame space under the pressure due to the steam issuing from the jets or nozzles, the two bodies, air and steam, intermingling and forming a curtain or veil over the entire body of the incandescent fuel. 15 20

If the steam and air is admitted to the furnace below the feed door the front shell of the furnace is provided with apertures into which the steam pipe nozzles are inserted for leading the steam and for drawing in air to be mingled therewith for forming the veil or curtain. It is proposed in this case to fit the screen upon the outside of the fire-box, so that the air can enter at the sides freely, whilst the engine is running in either direction. 25

The Invention is to be employed to all coal burning furnaces in which a flame space is left above the fuel.

It will be understood that the appliances just referred to form the second part of this Invention, the right to modify the arrangement being preserved thereto as found necessary. 30

Griffin's Impts. in Economising Fuel and Consuming Smoke in Furnaces.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said James Theodore Griffin in the Great Seal Patent Office on the 25th October 1873.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES
5 THEODORE GRIFFIN, of No. 77, Upper Thames Street, in the City of London, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-fifth day of April, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-
10 sixth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Theodore Griffin, Her special licence, that I, the said James Theodore Griffin, my executors, administrators, and assigns, or such others as I, the said James Theodore Griffin, my executors, administrators, and assigns, should at any time agree
15 with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for
“IMPROVED MEANS OF ECONOMIZING FUEL, DEVELOPING HEAT, AND CONSUMING
20 SMOKE AND GASES IN STEAM BOILER AND OTHER FURNACES, ALSO IN APPLIANCES THEREFOR,” communicated to me from abroad by Edgar F. Griffin, of Chicago, State of Illinois, United States of America, upon the condition (amongst others) that I, the said James Theodore Griffin, my executors or administrators, by an instrument in writing under my, or their, or
25 one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

30 NOW KNOW YE, that I, the said James Theodore Griffin, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, reference being had to the Drawings hereunto annexed, that is to say:—

35 This Invention relates to special means of economising fuel, developing heat, and consuming the smoke and gases within the fire-boxes or fire-

Griffin's Impts. in Economising Fuel and Consuming Smoke in Furnaces.

spaces of steam boiler and other furnaces. It consists in injecting a combination of air and steam into the smoke and flame space in a sheet or veil for the purpose of momentarily checking the passage of the smoke and gases to the tubes or flues, and thereby supplying them with sufficient oxygen for their perfect combustion. Within the fire-box or 5 flame space in lieu of allowing them to be carried away by the draught and their heating properties lost the sheet or veil of combined air and steam is spread over or about the surface of the fuel at an angle from the upper front edge of the fire-box to the rear of the furnace bars, or from below the feed door to the rear of the bars, as found most 10 convenient, or according to the construction of the furnace.

In the case of locomotive fire-boxes the air is supplied from the sides into a shell or screen, in which perforations or holes are made corresponding in number to a series of jets or nozzles of a steam pipe enclosed within the screen, the pipe having the jets or nozzles at the 15 required angle. By this means the air entering at the sides becomes heated, and issues into the flame space under the pressure due to the steam issuing from the jets or nozzles, the two bodies, air and steam, intermingling and forming a curtain or veil over the entire body of the incandescent fuel. 20

If the steam and air is admitted to the furnace below the feed door the front shell of the furnace is provided with apertures into which the steam pipe nozzles are inserted for leading the steam and for drawing in air to be mingled therewith for forming the veil or curtain. It is proposed in this case to fit the screen upon the outside of the fire-box, 25 so that the air can enter at the sides freely, while the engine is running in either direction.

The Invention is to be employed to all coal burning furnaces in which a flame space is left above the fuel.

It will be understood that the appliances just referred to form the 30 second part of this Invention, the right to modify the arrangement being preserved thereto as found necessary.

The accompanying Drawings represent how the Invention is carried into effect.

Figures 1 and 2 are sections of a portion of a locomotive boiler, in the 35 fire-box of which and at the upper fore part nearest the door is a casing

Griffin's Impts. in Economising Fuel and Consuming Smoke in Furnaces.

or screen *a*, into which atmospheric air is free to enter from the sides or in any convenient manner. *b* is a tube for conveying steam from the upper part of the boiler proper or from the exhaust while the engine is running to a transverse tube *c*, having a series of nipples or jets *d*, *d*, 5 rather close together, so that the jets of steam can slightly cross the path of their neighbouring jets to form a curtain, veil, or screen over the entire mass of fuel, the curtain, veil, or screen of steam taking a quantity of air from the casing *a* to commingle with it.

The veil or curtain of combined air and steam is forced across the fuel 10 upon the bars *e* at an angle from the front to the rear, where it or they strike against the foot of the fire-bridge *f*, thus checking the passage of the gases and smoke from the fuel and causing their consumption before they pass into the tubes *g*, *g*, of the boiler. This checking of the passage of the products of combustion from the fire to the tubes by a veil 15 or curtain of combined air and steam sensibly facilitates the combustion of the gases and other products which usually escape and are lost, and is the main novelty of the Invention to which claim is made without reference to the special appliances shown, but as appliances are needed for carrying the Invention into practice, the several Figures upon the 20 annexed Drawings show the best manner in which it has been found to answer.

I have referred to jets, but tubes having slits in them of convenient lengths can be employed, as indicated in Figure 3, or when it is desired to make the veil or curtain to cover a larger area than can be done by 25 the nipples or slits, one or more roses or spreaders, as in Figure 4, can be employed.

Figure 5 shows an arrangement of apparatus by which the jets or slitted tube enters the fire-box above the inlets for the air, the rush of steam across the air entries being such that by a sucking action the air 30 is caused to rush in and commingle with the steam.

The air tube or tubes can be arranged upon the outside of the boiler, as in Figures 6 and 7, and the air be caused to enter its tube from the side mouths *h*, *h*, or the air can be forced in by a fan or other apparatus upon the engine or upon some portion of the machinery in proximity.

35 In some cases a curved or rounded screen can be fitted inside the ordinary door of a furnace for the air on entering to strike against, and be thus spread into a thin film or veil, and a veil of steam can be forced

Griffin's Impts. in Economising Fuel and Consuming Smoke in Furnaces.

or directed above or below the film or veil of air to cause them to unite and commingle at the after portion of the fire-box. This will be understood by Figure 8, which curved plates or air spreaders can be fitted to any shape of boiler.

Figure 9 shows a boiler of the Cornish kind of construction, the several Figures being only shown to illustrate that the Invention is applicable to them.

I therefore claim,—

The injection of steam and air as separate currents, or steam and air combined into furnaces of steam boilers in a curtain, veil, or screen across the fuel upon the bars, such curtain, veil, or screen being equally spread over the entire mass of fuel, and at an angle for the purposes of checking the escape of the products of combustion, and thereby economising the consumption of fuel and preventing the deposition of sooty particles upon the tubes or boiler skin, substantially in the manner set forth and shown.

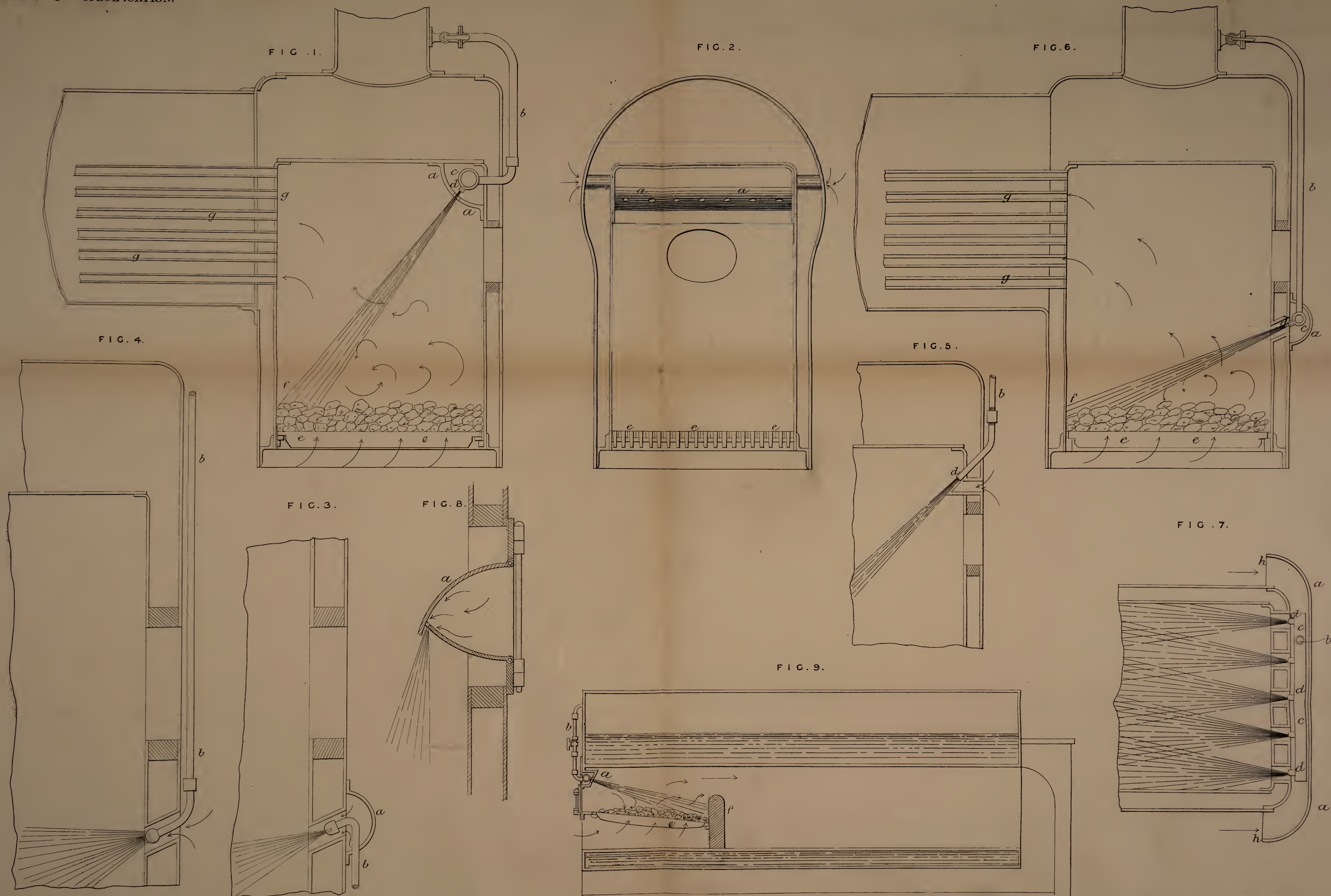
Secondly. I claim the means or apparatus described by which such curtain, veil, or screen of air and steam can be spread over or above the surface of fuel in fire-places or furnaces of boilers, as set forth and shown.

In witness whereof, I, the said James Theodore Griffin, have hereunto set my hand and seal, this Twenty-second day of October One thousand eight hundred and seventy-three.

JAMES T. GRIFFIN. (L.S.)

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1873.



The fixed drawing is not colored.

Drawn on Stone by Mauby & Sons

